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SOME EXPERIENCES WITH PHENOTHIAZINE

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The following is a report of the results of treatment with phenothiazine of cattle and sheep affected with moderate to severe stomach worm disease, carried out in the summer of 1940.

The phenothiazine used was in powder form without wetting agent and was supplied by Messrs. May & Baker for the purpose of the experiment.

The drug was given in the form of a suspension in water containing 0·5 per cent. gum tragacanth.

Cattle

Case I.—*Subjects.*—Thirteen calves between nine and 18 months old were affected in this case. Three had died before treatment was commenced. The remaining ten animals were very emaciated. Two were down and could only rise with difficulty. In all the animals the faeces were thin and watery. Random samples from two animals gave counts of 600 and 1,600 stomach worm eggs per gramme faeces. The calves were dosed with 45 grammes of phenothiazine and individual faeces samples were taken from three of them at the time of dosing and again ten days after dosing.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	10 Days after Dosing.
1	500	—
2	200	—
3	900	1,600

One of the two very poor calves died six hours after dosing. The other (No. 3) was still down and in very poor condition after ten days. It was given a second dose of phenothiazine but died from pneumonia three days later.

The remaining eight calves showed a remarkable improvement in condition when examined ten days after dosing. The coats were glossy and the skin pliable, the faeces were firm and the animals were showing signs of putting on flesh. A later visit to the farm showed that the animals were in good condition and had remained in good health throughout the summer.

Case II.—*Subjects.*—Two heifers showing symptoms of stomach worm disease were each given 60 grammes of phenothiazine.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	10 Days after Dosing.
1	500	100
2	900	—

Both these animals were well on the way to recovery when the second sample was taken.

Case III.—*Subjects.*—Three calves five to seven months old, extremely emaciated and passing watery faeces. These calves had been previously dosed with "Danistol" without showing any improvement in condition ; 60 grammes of phenothiazine was given to each calf. Unfortunately only one faeces sample was taken at the time of dosing.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	11 Days after Dosing.	47 Days after Dosing.
1	700	100	Not sampled
2	Not sampled	—	—
3	Not sampled	—	100

Calf No. 3 gave a count of 100 fluke eggs per gramme faeces in both samples.

After ten days the calves showed slight general improvement and the faeces were of normal consistence. When visited a month later the animals were markedly improved though still rather thin. These calves subsequently developed an attack of "hoose."

Case IV.—*Subjects.*—Three calves six months old not feeding and passing watery faeces were dosed with 45 grammes of phenothiazine.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	7 Days after Dosing.
1	1,600	400
2	1,500	—
3	1,300	—

Nos. 2 and 3 were very markedly improved a week after dosing. No. 1 was still in poor condition and the faeces were more fluid than normal. A second dose of 45 grammes of phenothiazine was given.

Four days later this calf was in better condition and taking some food. The faeces were firm and a worm egg count was negative. This case is still under observation but it is believed that the animals will now thrive.

Case V.—*Subjects.*—Two store bullocks passing watery faeces and in poor condition. A worm egg count from a composite sample of faeces showed the presence of 1,000 stomach worm eggs per gramme. A dose of 45 grammes of phenothiazine was given to each bullock. Five days later a second faeces sample was examined. This sample was of normal consistence and contained 200 stomach worms per gramme. The bullocks were considerably improved in general health.

Sheep

Case I.—*Subjects.*—Nine Border Leicester ewes with lambs at foot in moderate condition. These ewes were dosed with 20 grammes of phenothiazine in emulsion by stomach tube.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	9 Days after Dosing.
N.10	100	—
M.10	200	200
M.24	500	500
N.5	200	500
O.3	400	300
M.1	300	200
I.L.	2,500	1,100
O.5	500	400
M.8	700	1,300

Ewe No. I.L. had counts of *Dictyocaulus* larvae of 1,200 and 1,000 before and after dosing. This ewe was rearing three lambs, which may account for her decreased resistance to parasites compared with the remainder of the flock. No change in condition was seen in these sheep after dosing.

Case II.—*Subjects.*—A flock of 40 year-old black face ewe lambs, some of which were in very poor condition. One lamb slaughtered *in extremis* and examined *post-mortem* was found to contain 20 *Dictyocaulus filariae*, about 1,000 *Haemonchus contortus*, several thousand *Trichostrongylus* species, some 50 *Trichuris ovis* and about 150 *Chabertia ovina*, as well as a heavy fluke infestation. A worm egg count from the faeces of this lamb gave the following result: lung worm larvae 700; stomach worm eggs 3,500; fluke eggs 1,000, and *Trichuris* eggs 200.

Fourteen of the worst lambs were given 13 grammes of phenothiazine. Faeces samples were taken from five lambs at the time of dosing and 18 days later.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	18 Days after Dosing.
1	300	—
2	—	—
3	300	—
4	1,000	300
5	700	200

Fluke eggs in numbers of 100 to 300 per gramme faeces were present in all five samples on both occasions. The count of " whipworm " eggs was also not affected.

The whole flock showed considerable improvement on the second visit to the farm which unfortunately coincided with a flush of spring grass so that it was difficult to assess the change in the dosed animals.

Case III. *Subjects.*—A flock of 60 year-old black face cross ewe lambs. Two lambs had died prior to our visit. Seven ewe lambs were dosed with 20 grammes of phenothiazine.

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	12 Days after Dosing.
1	600	200
2	—	—
3	300	700
4	—	—
5	1,500	300
6	200	100
7	500	100

Coccidia and *Trichuris* eggs were present in these samples and were as prevalent in the second count as in the first. Lamb No. 6 had a count of 100 fluke eggs in both samples.

No very marked improvement was seen in these lambs at the second visit.

Case IV. *Subjects.*—A flock of 60 ewes and 96 lambs was visited on June 4th. All these animals were in poor condition and the majority were suffering from diarrhoea. Twenty-five lambs were given 20 grammes of phenothiazine immediately after a dose of 5 c.c. copper sulphate solution. The copper sulphate was administered in an attempt to close the oesophageal groove before putting the stomach tube into the oesophagus. Faeces samples were taken from eight lambs at the time of dosing.

As there was no improvement in the dosed lambs after nine days the entire flock was dosed with a copper sulphate-nicotine sulphate mixture. ["Veterinary Helminthology and Entomology"—H. O. Mönnig—Baillière, Tindall and Cox (1934), p. 86.]

Stomach worm eggs per gramme faeces :—

	At Time of Dosing.	9 Days after Dosing.	28 Days after Dosing.	57 Days after Dosing.
1	600	—	100	—
2	400	100	—	Not sampled
3	100	300	100	—
4	200	500	—	200
5	100	Not sampled	Not sampled	Not sampled
6	—	—	—	Not sampled
7	100	—	Not sampled	200
8	700	—	Not sampled	100

This case was complicated by the presence of coccidiosis in all faeces samples examined.

The flock was visited 12 days after dosing with copper sulphate and nicotine sulphate when a remarkable improvement in condition was seen and the faeces were normal. Three doses of copper sulphate and nicotine sulphate were given at intervals of 14 days, and the improvement in condition was maintained. By July 31st, 40 of the lambs had been sold fat.

Technique

Worm egg counts were carried out by the Taylor method, faeces samples being taken in most cases direct from the rectum.

Dosing in cattle was carried out by drenching in the ordinary way with a suspension of the selected weight of phenothiazine in 300 to 400 c.c. of water. In sheep the dose was given by passing a piece of pressure tubing into the oesophagus and giving the suspension from a 100 c.c. syringe. This method was found rather cumbersome when dealing with more than a few animals.

DISCUSSION

Cattle Cases.—Twenty young cattle from six months to two years old, and showing symptoms of parasitic gastritis, were dosed with from 45 to 60 grammes of phenothiazine. Of these 20 animals,

two died shortly after dosing, and three remained thin and subsequently developed an attack of "hoose". The remainder showed a marked improvement in condition in from seven to ten days after dosing. In all cases except in the animals which died there was a considerable reduction in the worm egg count. No toxic symptoms attributable to the phenothiazine were observed in these cases. The two animals which died were *in extremis* at the time of dosing, and can therefore be discounted to a certain extent when assessing the value of the drug.

In the author's opinion phenothiazine is the most promising anthelmintic for stomach worms in cattle which we have so far used in this Division.

Sheep Cases.—The results in the sheep cases treated were much less satisfactory especially when compared with those of Taylor *et al.* (*Vet. Rec.* **52.** No. 36. Sept. 7th, 1940).

This is possibly due to the mixed parasitic infestation present in our cases.

A surprising fact was the success following the administration of copper sulphate and nicotine sulphate in Case No. III where the stomach worm infestation was complicated by the presence of coccidia. This mixture was given after a dose of phenothiazine had failed to produce any improvement in the condition of the lambs.

The author's previous experience of copper sulphate and nicotine sulphate is that it appears to act as a tonic without materially reducing the worm egg count.

Summary

1. Dosing calves suffering from parasitic gastritis with 40 to 60 grammes of phenothiazine gave very encouraging results.

2. Dosing sheep suffering from stomach worm disease with 13 to 20 grammes phenothiazine was much less satisfactory.

Acknowledgements.—I wish to thank Messrs. A. McFarlane, A. Thompson, D. McKelvey, and H. H. Carlisle, veterinary practitioners who supplied the cases, and also Messrs. May and Baker who kindly supplied the phenothiazine for the purpose of the experiment.

Bibliography.—A full bibliography was published by Taylor *et al. Vet. Rec.* **52.** No. 36. September 7th, 1940.

"ZIPP" PASTE

A paste consisting of zinc oxide, 1 part; iodoform, 2 parts, with liquid paraffin, 2-3 parts, is recommended in the treatment of wounds. The ingredients are placed in a mortar and ground together until a paste of the consistency of clotted cream is formed. This "Zipp" paste is stated to possess several advantages over B.I.P.P., the principal one being the avoidance of any danger of poisoning.—W. K. Connell (*Brit. Med. J.*, 1940, i, 273).

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In future all prosecutions for offences against the food regulations are to be supervised by the Divisional Food Officer. Food Control Committees will report to their Divisional Food Officer cases brought to their notice in which they have not prosecuted, as well as those in which they intend to prosecute.

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Mr. J. C. Taylor, M.R.C.V.S., "Teemore," London Road, Beccles, Suffolk, writes: "During by absence on military service I cannot accept students who may wish to obtain practical experience in my practice. I would be obliged if all concerned would please note this fact and thus save unnecessary delay and correspondence."

An Interpretation of the Clinical and Laboratory Findings in Azoturia*

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The investigation of the etiology of azoturia is attended with difficulty. The disease cannot be produced experimentally at will. Cases occurring naturally are not numerous. They are widely distributed, and usually occur under conditions unfavourable for intensive biochemical study. The predisposing factors, such as a period of hard work followed by a short period of rest without reduction in the feed consumed, are so widely accepted and well established that they cannot be challenged as essential in causing the disease. These facts, however, throw little light on the disturbance of metabolism that occurs. Some studies of the blood and urine have been made, and excellent clinical descriptions of symptoms have been written. Probably the best summary of our present state of knowledge of this condition is given by Udall.[1] If we may be permitted to quote: "Few diseases have been the subject of so many theories concerning the essential cause and the primary pathological changes. It has been variously described under diseases of the liver, the kidneys, the blood and muscle. It has been attributed to infection, cold weather, intoxication, nervous irritation, calcium deficiency, excessive glyocen, lactic acid poisoning, increase of red blood cells and unbalanced alkali reserve."

Vitamin C probably occurs in small amounts in all of the cells and tissues of the body. Vitamin C has been found to be present in the cortex of the adrenal glands in relatively large amounts. It is much reduced in the adrenals after strenuous muscular work.[2] The muscles contain relatively little vitamin C. This suggests that vitamin C may play an important rôle in muscular metabolism, possibly as a catalyst.[3]

The increase of lactic acid in the blood in azoturia suggests an impairment in the oxidation of glucose by the muscle.[4] Since the lactic acid is formed, it is probable that the first phase of muscular contraction, the anaerobic breakdown, may proceed as usual. Since it seems necessary to produce carbon dioxide in order to lower the oxygen tension of the muscle before oxygen may be obtained from the blood, it would indicate that oxygen must exist in some readily available form within the muscle cell during the anaerobic phase of contraction. Possibly this oxygen is in union with glutathione. That vitamin C, ascorbic acid, may be concerned in the oxidation of glutathione by the interaction of ascorbic acid and peroxidase, has been suggested.[5, 6]

In azoturia there is usually a preceding period of hard, muscular work, and presumably the vitamin C in the adrenal cortex would be much reduced. An insufficient supply of vitamin C from this source might lead to adrenal failure and the arrest of the affected muscles in the stage of anaerobic breakdown or contraction.

The above suggested that an investigation of the amount of vitamin C in the blood of both normal horses and cases of azoturia might be of interest.

Blood samples for the determination of ascorbic acid from cases of azoturia were obtained by the attending veterinarians and mailed to the laboratory. In a few instances, two samples were taken, one sample being obtained in a bottle containing sodium oxalate for plasma

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determinations. In these cases, which occurred in territory near the laboratory, the samples were brought to the laboratory by the veterinarians. A few of the normal horse samples were obtained by the author from animals in the vicinity of the laboratory. Both plasma and serum samples were obtained. Some of the normal horse samples of both plasma and serum were obtained by veterinarians in the immediate vicinity and brought to the laboratory. Other normal serum samples were obtained by veterinarians located at some distance from the laboratory, and sent in by mail.

It was thought that the veterinarians would have blood tubes for serum samples at hand when attending cases of azoturia, as the tubes sent them for Bang's disease would be suitable. In order to obtain plasma samples, special tubes containing oxalate would be necessary, and would have to be carried about by the veterinarians until they were called to treat a case of azoturia. Inasmuch as these samples were obtained for us without compensation, it was desirable to make the procedure as simple as possible to avoid delay in the treatment of the case.

The determination of ascorbic acid in serum or plasma was carried out according to the method of Farmer and Abt as set forth in Hawk and Bergeim.[7] The titration was conducted with a solution of 2,6-dichlorobenzenone-indophenol made by dissolving a tablet (Hoffman-La Roche) of the dye, equivalent to 1 mg. ascorbic acid, in 500 c.c. of distilled water. One c.c. of this solution, therefore, would be equivalent to 0·002 mg. ascorbic acid.

TABLE I

Ascorbic Acid in Normal Horse Blood
Mg. per 100 c.c. of Serum or Plasma

Sample No.	Serum	Plasma
0	0·8	—
1	0·65	0·7
2	0·23	0·4
3	0·44	0·65
4	0·72	0·72
5	0·33	0·17
6	0·8	—
7	0·4	—
8	0·75	0·65
9	—	0·72
10	—	0·7
11	0·42	—
12	0·55	—

TABLE II

Ascorbic Acid in Horse Blood in Azoturia

Sample No.	Serum	Plasma
A 1	0·15	0·02
A 2	0·0	—
A 3	0·05	0·025
A 4	0·35	0·275
A 5	0·35	—
A 6	0·29	—
A 7	0·35	—
A 8	0·05	—
A 9	0·025	—
A10	0·0	—
A11	0·05	—
A12	0·0	—

Due to the dilution factor, it was found that a measurable amount of dye had to be added to the 2 c.c. of plasma filtrate before any colour could be seen. This amount was determined by titrating a blank consisting of 2 c.c. of water acidified with a few drops of metaphosphoric acid. The figures in Tables I and II give the values corrected for the blank. In the azoturia samples, a blank was run with every determination. This was done in only a few cases with the normal serum and plasma. However, as the blanks agreed very closely in all cases, it was believed justifiable to correct the values for the normal blood with an average blank value.

As there was usually a delay of a day or more between the time of bleeding and the time of making the ascorbic acid determination, due to the delay in the mail, it seemed desirable to find out whether the ascorbic acid value changes on standing. Fresh samples were held over for one or two days in the refrigerator and at room temperature, and it was found that the drop in ascorbic acid value was within the limits of experimental error.

The first eleven azoturia samples were from cases that terminated in recovery, and, therefore, might be considered mild cases. The last azoturia sample, A12, was from a severe case that ended fatally.

The values which we obtained for normal horse blood are low compared to the average values for human blood obtained by Taylor, Chase and Faulkner, quoted by Hawk and Bergeim,[11] namely, an average of 1·61 mg. per 100 c.c. with a range of from 0·8 to 2·4 mg. The author is not aware of any published values on horse blood to date.

DISCUSSION

It would seem necessary to account, as completely as possible, for the symptoms and changes in the blood as reported in azoturia if the theory of a vitamin C deficiency is to be considered as the cause of the disease. The symptoms and changes in the blood which are thought to be related will be considered as a group. The first group of symptoms to be considered will consist of the usual normal temperature, hard, boardlike swellings of the affected muscles, posterior weakness or paralysis, and increased lactic acid in the blood.

Since the change from glycogen to lactic acid is accomplished by enzymes,[8] the enzymes may continue to attack the glycogen, producing more and more lactic acid and water until the reaction is terminated in much the same manner as a fermentation is poisoned by its end products.

"When muscle is kept in an atmosphere free from oxygen, the lactic acid accumulates up to a certain point, after which the muscle loses its irritability, and no further heat production is manifest."[9] It would seem probable that the increase in lactic acid would account for the posterior weakness and loss of muscular control in azoturia. This may also explain why there is no marked rise in body temperature. Of interest is a description of a symptom of scurvy: "Ultimately, almost complete powerlessness in the legs or in the hind limbs of animals, a kind of pseudo-paralysis."[10] Also of interest is the marked muscular weakness in Addison's disease, with destruction of the adrenal cortex alone.[11]

The second group of symptoms is: increase in red blood cells, decreased amount of urine, haemoglobin in urine, and congested and icteric mucous membranes.

The increase in the red blood cell count may be a result of the loss of body fluid to some extent, or due to the condition of partial muscular asphyxia. It may be that, as in Addison's disease, we have a dehydration with blood concentration causing a relative increase in red cells.

"The cortical hormone of the adrenals controls the passage of sodium between the blood plasma and the tissues and cells. If it is deficient, the sodium tends to

pass from the blood into the tissues. As it passes into the kidney cells it is lost to the body *via* the urine. Water follows sodium, with a resulting dehydration and blood concentration."[12] As a result, early in the attack the bladder may be found full of urine. If the blood rapidly becomes so concentrated that it cannot be filtered through the glomeruli of the kidneys, little or no urine will be excreted.

The increase in red cells would account for the congested appearance of the visible mucous membranes. The blood concentration may interfere with the liver function and account for the icterus. There remains to account in some manner for the haemogobinuria. The results of the spectroscopic examination of haemoglobin and myoglobin as reported by Carlström would indicate that myoglobin cannot be entirely excluded from consideration.[13] Formerly, the liver was believed to be the only site of red cell disintegration. This view is no longer generally held, for it seems that the disintegration of corpuscles may occur in the blood stream as well as in other tissues.[14] If so, small amounts of haemoglobin must constantly be carried by the blood stream to the liver, there to be converted into bile pigment, even if the amount is too small to be detected by spectroscopic examination of the blood plasma. For purposes of illustration, let us assume that the blood volume of the horse is about 29 litres.[15] In large horses, blood volumes of from 70 to 75 litres have been found. If we assume the smaller volume and the life of a red cell to be 40 days,[14] there will be a daily destruction of red cells equal to the amount in 725 c.c. of blood or an hourly destruction of the amount found in 30 c.c. or 43 c.c. for a horse with the larger blood volume. In case the liver function was impaired by the blood concentration, some of this haemoglobin might be expected to appear in the urine. This might occur without appreciable amounts being found in the blood plasma.

The third group of symptoms is: rapid, irregular, weak pulse; dyspnoea; restlessness and sweating early in the attack. Traces of sugar are found in the urine in a few of the cases only.

If both the cortex and the medullary portions of the adrenals function as a unit, it is possible that a loss by the cortex of too great a portion of the stored vitamin C would result in a suppression of adrenalin. This might account for the rapid, irregular, weak pulse often encountered in azoturia. The lack of adrenalin may lead to a condition of relative hyperinsulinism and account for some of the symptoms of azoturia. "The hormones of other ductless glands (pituitrin, thyroxin and adrenalin) exert a direct or indirect antagonistic action to insulin, the blood sugar level being a balance between the two forces."[16] "In adults, mild symptoms, nervousness, tremor and palpitation, appear when the blood sugar falls to 50 or 60 mg. per cent. As the value drops, sweating is constant, and is the forerunner of serious symptoms. Convulsions, coma and death occur only with extremely low blood sugar values."[17] From the above, it will be seen that the early symptoms of azoturia are somewhat similar to insulin shock. If this is so, the condition, azoturia, should be accompanied by low blood sugar values.

"Recently Purr reported that ascorbic acid is a specific activator for the beta type of animal amylase (amylase of human saliva, pig pancreas and rabbit liver) . . . B-Amylase of animal tissues occurs in the almost inactive state."[18] The lack of vitamin C to activate liver amylase may account for a failure of the conversion of liver glycogen to dextrose and the maintenance of a normal blood sugar level.

Studies of the blood have been made by Hayden[19, 20] covering 13 samples from cases of azoturia. The blood sugar is reported as follows: 102·6—183·6—169·0—140·8—111·0—99·8—99·8—90·8—152·0—174·8—94·0—57·3—99·1. One sample only was below 60 mg. per cent. and can be considered low enough to produce symptoms. It is to be noted that the blood sugar values reported by Hayden vary quite widely, from a low of 57·3 to a high of 183·6. He concludes that the quantity of sugar found in average or individual cases so far does not justify the claim that azoturia may be due to disturbed carbohydrate metabolism. We do not wish to question the findings, but believe that a different interpretation of the data in relation to symptoms of the disease might alter this conclusion. We will assume that in the horse, as in man, mild symptoms such as nervousness, tremor and palpitation appear when the blood sugar falls to 50 or 60 mg. As the value drops to 40 or 50 mg., sweating would be constant, and convulsions, coma and death would occur only with extremely low blood sugar, 20 mg. or less.[21] The renal threshold for sugar is assumed to be 160 mg. There has been a preceding period of work, followed by a period of rest; the muscles and liver are filled with glycogen and the vitamin C in the adrenal cortex is reduced in amount. The animal appears normal, but is in a condition to be readily susceptible to an attack of azoturia. The horse is now taken from the stable and exercised. There is a diminishing internal secretion from the adrenals. This diminishing supply is utilised by the muscles at the expense of the liver. This interferes with the production of dextrose by the liver, and there is insufficient adrenalin to oppose the action of the insulin and insufficient vitamin C to activate the liver amylase. The blood sugar falls rapidly to 45 mg. As this occurs, the gait becomes stiff and the animal stops. The psoas and quadriceps femoris muscles are affected, as has been described above, and the animal goes down. With the blood sugar at 45 mg. restlessness, profuse sweating and dyspnoea are prominent symptoms. The muscles now require a comparatively small proportion of the still diminishing supply of adrenal secretion, so that, for a time, relatively more is available for use by the liver. There now occurs a slight rise in blood sugar to 85 mg. and the sweating ceases. At this point there is a loss of slightly under half of the water in the blood to the tissues, due to a failure of the hormone of the adrenal cortex which is said to control sodium balance, a small proportion of the water being excreted by the kidneys as urine. The red cell count increases to 14 million, due to this concentration of the blood. The blood sugar reads 165 mg. A trace of sugar now appears in the urine, as the renal threshold of 160 mg. has been exceeded. A blood sugar test at this time would indicate a slight hyperglycaemia, while the concentration of the blood would mask a true hyperglycaemia. The pulse is rapid, irregular, and weak, due to diminished blood volume. The blood sugar values obtained may well depend upon the time elapsed between the onset of the attack and the securing of the blood sample. Samples taken at random from a series of cases might give the varied results reported by Hayden.

A number of intravenous preparations are commonly used in the treatment of azoturia. Sodium bicarbonate alone or combined with sodium sulphate,[22] calcium chloride, sodium sulphate and calcium gluconate are also used.[23] It is interesting to note that these preparations

have one thing in common; they are all hypertonic solutions. It is doubtful that all of them could have a specific action, and one wonders if any beneficial effect does not depend solely on their ability to combat blood concentration. Ringer's solution might be modified by the addition of sodium chloride up to 5 per cent. and combined with dextrose 10 per cent. as an agent to restore blood volume. Such a solution might have the advantage of correcting any sudden drop in blood sugar in case the correction of blood volume should proceed at too rapid a rate. Adrenalin has been much employed in the treatment of azoturia. The use of vitamin C or the adrenal extract (cortin) in an attempt to restore adrenal function still remains to be explored by the clinician.

Conclusions

1. A deficiency of vitamin C in serum samples from cases of azoturia as compared with samples from normal horses has been demonstrated.

2. A theory that this deficiency in vitamin C may be the cause of azoturia has been discussed.

3. The first conclusion cannot be considered as sufficient evidence completely to prove the theory.

Acknowledgment

I wish to acknowledge the assistance of Harriet M. Thomson in making the vitamin C determinations on the blood samples reported, also my indebtedness for her translation of Carlström's paper.

[The author expresses his thanks also to a number of veterinarians for sending him samples from azoturia cases and normal horse samples.]

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Cork Co. Committee of Agriculture allocated a total of £17,900 for agricultural and livestock schemes for 1941-42. It was agreed to set aside £200 of the £400 for horse-breeding premiums for premiums to Clydesdale and Shire stallions. It was the view of the members that the only horses now in demand were those of the heavier type and that light horses are unsaleable.

CLINICAL COMMUNICATION

Traumatic Rupture of the Diaphragm in a Horse*

G. A. KEATINGE, M.R.C.V.S.
Portadown, Co. Armagh

Subject.—Chestnut gelding, four years, half-bred.

History.—At the end of March, or early in April, this horse fell on a harrow, got up again, and went on with his work. The next day a swelling about the size of a hen's egg appeared at the level of the trace and over the last two ribs on the near side.

Examination and Course.—I was attending another case at this farm some weeks afterwards and was asked to look at the horse. I examined the swelling and decided that there was nothing more than thickening of the tissues after the violence caused by the fall, as there were no marks on the skin, which had not been broken. During the week commencing April 24th this horse exhibited symptoms of colic on four different occasions at varying intervals, each attack getting a little worse, although one drench administered by the owner brought about apparent recovery and return to normal routine.

On May 1st I was first sent for to see the horse in the morning. When I arrived the case, to all intents and purposes, was one of ordinary flatulent colic. On arrival later in the day the case was very much worse. The temperature was 105°, respirations were greatly increased, the pulse very rapid and pronounced, and there was a constant and copious sweating. The animal was very unsteady on its limbs and inclined to rest with its head against the wall. The horse continued in this condition all night, and despite the treatment given, all the next day and into the morning of May 3rd, death supervening about 4 a.m. on the 3rd.

Post-mortem Examination.—This, carried out at 9 o'clock on the 3rd, revealed nothing unusual with the exception of a circular rupture of the diaphragm, with what is most easily described as a rim or thickening of the circumference of the rupture. The diameter of the rupture was approximately three inches, through which had passed 17 feet of the small bowel. This portion of the bowel had become strangulated, as was to be expected.

The rupture was situated at the same level as the exterior swelling and about one inch from its anterior aspect. From this it is assumed that the blunt end of the spike of the harrow forced the skin between the last two ribs and ruptured the diaphragm by force without having broken the skin or ruptured the muscle.

*Case reported to the North of Ireland V.M.A. at Belfast, September 6th, 1940.

DAIRY FARMERS AND THE WAR EFFORT

"We are approaching the months when the industry's determination to maintain the milk supply will be put to the combined tests of war and weather; when a restricted quantity of purchased feeding stuffs must be countered by its judicious use as supplements to home-grown food," observes the *Home Farmer*, and continues: "Stock rations must not exceed the maintenance requirements and milking capacity of the herd, a close watch will have to be kept on the health of all animals, and no effort must be spared to preserve the standard of production. The highest degree of skill in farming is now called for. Milk is a national need in a national emergency and the responsibility of dairy farmers is as great as that resting with our armament makers."

ABSTRACTS

[THE ISOLATION OF *CL. WELCHII* TYPE B FROM FOALS AFFECTED WITH DYSENTERY. Mason, J. H., and Robinson, E. M. (1938.) *Onderstepoort J.* **11.** 333.]

In 1936, seven out of 43 foals, and in 1937, seven out of 17, died of acute dysentery at one farm. Between the 24th and 48th hours the foals stopped suckling and appeared in pain, diarrhoea was marked with fluid reddish-brown faeces. They gradually became weaker and died in a comatose state in 12 to 24 hours. The temperature was normal and the breathing very rapid. On *post-mortem* examination the small intestine was markedly hyperaemic, showing a number of dark red spots, especially on the ileum, but no ulcers. The large bowel was also hyperaemic but less so than the small. The contents were fluid and dark red. The only organism found on culture of the organs and intestines was *Cl. welchii* type B in the small intestine and this is thought to have been the cause. The outbreak was stopped by allowing foaling only out in the open. P. S. W.

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[VITAMIN E DEFICIENCY IN DOGS. Anderson, H. D., Elvehjem, C. A., Gouce, J. E. (1939.) *Proc. Soc. Exp. Med. Biol.* **42.** 750-755. (6 figs., 5 refs.).]

Fox-terrier puppies whose parents had been maintained on mineralised evaporated milk developed an acute vitamin E deficiency. No signs of such deficiency appeared in the adult dogs except under the strain of gestation and lactation. One female produced three pups. One died after a few hours. The others developed signs of muscle dystrophy about the 20th day. The greatest weakness appeared in the joint between the femur and tibia, but the muscles of the fore limb were also affected. A general lack of muscular tone and hypersensitivity to pain were characteristic in the deficient animals. There was marked denudation of the head and limbs, together with a dry skin condition resembling cretinism. Subcutaneous injections of lysine and oral doses of liver extract powder failed to correct the disorder, but wheat germ oil was quickly successful. A second bitch produced pups which were diseased, and later developed signs of deficiency herself. In addition to symptoms of muscle dystrophy she developed sores on the teats, feet and belly. Half of her pups were reared on a diet reinforced with vitamin E supplement ; the others received evaporated milk only. The former showed excellent progress, but the latter became emaciated. The legs became thin, and there was marked weakness of the feet. There was a tendency to sag at the joints and some difficulty in keeping the toes straight.

The condition appears to be identical with the vitamin E deficiency previously described in rats, guinea-pigs and rabbits. It is cured by synthetic α-tocopherol (vitamin E) if administration is commenced early in the disease. D. D. O.

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[STUDIES ON *ERYSIPELOTHRIX RHUSIOPATHIAE*. Watts, P. S. (1940.) *J. Path. & Bact.* **50.** 355-369.]

These studies were made to determine whether the occasional failures in the use of immune serum for the control of swine erysipelas could be attributed to antigenic differences between strains of *E. rhusiopathiae*. Forty-three strains were used, these having been obtained from America, Japan, England and other parts of Europe. The majority were isolated from pigs, but four were ovine strains.

On the basis of morphology and culture it was not possible to make any distinction, but when examined serologically 38 strains appeared to be of one antigenic type and five of another. These two groups were not very sharply demarcated since considerable cross-agglutination occurred. This is attributed to the presence in each group of heat-labile antigens because when heated antigens were employed for the production of antisera no cross agglutination occurred. Each group also contained a heat-stable specific antigen. There was no correlation between country of origin or animal host and the serological groups.

Experiments to ascertain whether these antigenic variations had any immunological significance showed that the heat-labile antigens were the important antigens with regard to resistance to infection. Sera prepared against heated antigens did not afford protection to mice against lethal doses of the organism although death was delayed in some cases.

Vaccination of pigs with a formolised vaccine failed to protect them against a minimal infecting dose.

G. D.

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[IRRADIATION OF CANCER FOLLOWING INJECTION OF COLCHICINE. Guyer, M. F., Claus, P. E. (1939.) *Proc. Soc. Exp. Med. Bio.* **42.** 565-568. (2 tabs., 1 fig.).]

Cancer cells are reported to be vulnerable to the effects of X-rays during prophase and metaphase stages of division. Colchicine arrests mitosis in metaphase, and keeps it static for 15 to 25 hours. The possibility that colchicine treatment of carcinoma subjects followed after some hours by irradiation might be more effective than X-ray treatment alone was therefore explored. Experiments were performed on 672 rats. The conclusion was reached that X-rays were markedly more lethal to carcinomas from colchicine-treated animals than to those from untreated controls. The administration of the colchicine was most effective 15 to 18 hours before irradiation. Light, frequent doses of X-rays were more effective in securing disappearance of the tumours than heavy, infrequent exposures.

D. D. O.

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[EFFECT OF OVARIAN HORMONES ON THE GENITAL ORGANS OF NORMAL, CASTRATED AND HYPOPHYSECTOMISED DOGS. Samartino, R., and Arenas, N. (1940.) *C. r. Soc. Biol.* **133.** 321-323.]

Various investigators have induced oestrus in the bitch by the injection of oestrone. The present authors state that 200, 500 or 3,000 I.U. of oestradiol benzoate produces clearly marked symptoms of oestrus in the adult bitch. An important finding reported by the authors is that doses of from 200 to 5,000 I.U. oestradiol benzoate given daily for periods ranging from 15 to 87 days will produce strong oestrus-stimulating reactions in the Fallopian tubes, uterus and vagina in both castrated and hypophysectomised bitches. The action of progesterone on the uterus of the bitch has also been studied. It was found that injection of 3 to 5 rabbit units of this hormone, after preliminary sensitisation with 200 I.U. oestradiol benzoate given daily for 20 to 25 days, produced active changes in the glandular tissue of the endometrium.

N. J. S.

[SOME EFFECTS OF ANAESTHETIC MIXTURES DISSOLVED IN OIL ON MOTOR NERVES IN THE CAT. Duncan, D. (1939.) *Proc. Soc. Exp. Med. Biol.* **42**. 405-407. (9 refs.).]

Injections of local anaesthetics in oil have been reported to produce anaesthesia lasting from several days to as long as one month. In order to study the physiological aspect of the subject procaine and nupercaine bases in oil were injected into the subcutaneous tissues of the face in cats. In each case complete paralysis of the orbicularis oculi muscle, lasting several hours to three weeks, was obtained. On autopsy 10 to 31 days after injection marked degeneration of the facial nerve fibres was detected in every subject. The extent of the degeneration varied from a few scattered fibres to complete branches. As a general rule the amount of degeneration was directly proportional to the duration of the paralysis. Injections of oil alone have neither anaesthetic nor degenerative effect.

D. D. O.

REPORT

[NORTHERN RHODESIA: Report of the Veterinary Department for the year 1939.]

The task that confronted the Director of Veterinary Services (Mr. J. P. A. Morris) and his staff of veterinary officers and lay assistants during 1939 was not an enviable one, because in addition to their usual onerous duties of coping with the large number of formidable enzootic diseases and other problems menacing the welfare of the Colony's livestock, a serious emergency arose on account of the spread of rinderpest southwards through Tanganyika to the northern frontier of the Colony. Staff had to be diverted to meet the emergency to carry out extensive immunisation of the threatened cattle and to locate infected game and prevent their movement becoming an immediate source of further extension. This work was undertaken in collaboration with staff from neighbouring territories which were also gravely concerned by the threat of this epizootic. The authorities in the whole of southern Africa became alarmed by it. Rinderpest has not got so far south in Africa since the great epizootic which occurred at the end of the last century and which destroyed countless numbers of animals including game in the sub-continent in a few years. News has not yet reached us of the result of the defensive measures taken against the present outbreak. Its occurrence brings to our notice once more the urgency of exterminating rinderpest. Now that there are reliable and easy means of doing this, it does appear foolhardy to delay further in the matter.

The major enzootic diseases in Northern Rhodesia are bovine pleuro-pneumonia, trypanosomiasis, horse sickness, heartwater, anthrax, anaplasmosis, piroplasmosis and helminthiasis. There is little to note of unusual character about these beyond their economic effects on the livestock industry and the tireless efforts of an understaffed Department to deal with them by the recognised methods of treatment. Much success is claimed for vaccination against pleuro-pneumonia with culture vaccine. Against trypanosomiasis little can be done since five-eighths of the country is tsetse-ridden. Horse sickness is successfully dealt with by neuro-virus vaccination, and dipping at regular intervals in the many tanks now in the Colony helps to keep heartwater, anaplasmosis and piroplasmosis in check. Fowl typhoid and bacillary white diarrhoea are common in poultry and steps are being taken to limit their extension.

In addition to disease control the Department has recently inaugurated a Livestock Section to improve the husbandry of native-owned stock and generally to raise the standard of knowledge in livestock matters of the native owners. The work of the research station is not included in the report.

W. K.

IN PARLIAMENT

The following are among the questions and answers recently recorded in the House of Commons:—

Agriculture (Livestock)

Mr. R. Morgan asked the Minister of Agriculture whether, in view of his insistence on the maximum of cereal production in this country, he will take simultaneous action to ensure the maintenance of sufficient livestock for the purpose of supplying an adequate quantity of natural manures?

Mr. Hudson: The number of livestock that can be maintained is governed by the available supply of feeding-stuffs of all kinds, both home grown and imported, including grazing. In carrying out the food production campaign farmers are being encouraged not only to grow more cereals and other crops for direct human consumption, but to grow more feeding-stuffs, including cereals, for their own stock. As a result of this policy it has been possible to keep our livestock population other than pigs and poultry at a high level. The numbers of cattle have in fact increased during the first year of the war.

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Milk (Pasteurisation)

Mr. David Adams asked the Minister of Health whether, in view of the large and increasing numbers of children previously living in large centres of population where much of the milk had been rendered safe by pasteurisation who are being transferred to rural areas where pasteurisation is non-existent or at a minimum, he will officially circularise those responsible for the health of these children that all milk they consume must first be sterilised by boiling?

Mr. M. MacDonald: An announcement with regard to the desirability of boiling all milk that has not been pasteurised or sterilised was recently issued by my right hon. and Noble Friend the Minister of Food. I will consider with him whether any further publicity can usefully be given to this aspect of the matter.

VITAMIN B_1 IN BREAD

The Minister of Food has appointed a committee for consultation with the Ministry on the administrative and technical questions associated with the introduction of synthetic vitamin B_1 and calcium into white flour. The committee, which includes representatives of the flour milling industry and the baking trade, is constituted as follows:—

Mr. H. D. Vigor (Chairman), Mr. Edmund B. Bennion, M.Sc., Mr. W. Bloor, Professor E. C. Dodds, D.Sc., Mr. T. H. Hodgson, Professor R. A. Peters, F.R.S., Mr. J. Arthur Rank, Mr. Arthur Robinson, and Dr. J. Sword.

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The journal of the National Institute for the Blind states that border collies and golden retrievers are being tried as guide dogs for blind pedestrians.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Nov. 9th.—Meeting of the Scottish Metropolitan Division, N.V.M.A., at Edinburgh, 11 a.m.

Nov. 15th.—Meeting of the Eastern Counties Division, N.V.M.A., at Cambridge, 11.30 a.m.

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Reservation of the Profession

In our last isue we made preliminary reference to the circular issued by the President of the Royal College of Veterinary Surgeons asking members whose practices have been affected by the war, or whose employment has ceased, to supply particulars, inasmuch as information concerning the present state of unemployment within the profession is essential to the consideration of the question of possible modification of the existing reservation of veterinary surgeons from military service. The President's letter is as follows:—

ROYAL COLLEGE OF VETERINARY SURGEONS
30, Park Lane,
Wembley,
Middx.

October 26th, 1940.

Dear Sir,—As you are probably aware, some criticism has recently been expressed in regard to the position of Veterinary Surgeons as members of a profession included in the Schedule of Reserved Occupations. This prevents their being accepted for Military Service except in their professional capacity, but there are, in fact, no vacancies for officers in the R.A.V.C. On the other hand it is alleged that a number of Veterinary Surgeons are now unemployed and a larger number still whose work has diminished considerably, and that the complete reservation of Veterinary Surgeons unnecessarily debars the profession from making any contribution to the Armed Forces.

Before adequate consideration can be given to this matter in consultation with the Ministry of Labour and National Service, it is essential to ascertain whether in fact the amount of unemployment in the profession is of such extent as to call for some relaxation of the existing reservation.

In order to obtain this information I am issuing the enclosed questionnaire to all members in general practice. If you are unemployed or if your practice has suffered serious diminution I should be glad if you would kindly complete the particulars asked for on the enclosed form and return it to the Secretary, R.C.V.S., 30, Park Lane, Wembley, as soon as possible.

The information as to your personal position will not be divulged but will be kept in strict confidence in the office of the College. It is required merely for the purpose of the preparation of statistics showing what is the present state of unemployment within the profession.

Yours faithfully,
JOHN HOLROYD,
President.

The confidential questionnaire to which reference is made enquires (after personal particulars) as to the member's position in practice (owner, partner, assistant, or other capacity); the nature of the practice and the approximate percentages of types of animals attended; in the case of owners and partners, as to diminution of practice and to what extent, and, if the member is unemployed, as to the period of such unemployment.

Roll of Honour

PRISONERS OF WAR.—From a private source we learn, with much regret, that Captain George Blakemore Lewis (R.A.) of Campbeltown, Argyll, who qualified M.R.C.V.S. at Edinburgh in December, 1933, is now a prisoner of war in Germany. His address is Capt. G. B. Lewis, R.A., British Prisoner of War, No. 1441, Oflag VII C/H, Germany.

The War Office casualty list published on October 28th included among the officers who are prisoners of war the name of Major F. J. Eardley, Royal Army Veterinary Corps.

Major Eardley, who is well known in Gloucester, where he practised before the war and was veterinary surgeon at the Gloucester and Cheltenham Greyhound track, had served for 15 years in the Royal Army Veterinary Corps of the Territorial Army.

Called up for service on the outbreak of hostilities, he was attached to a Northern Command until December, when he went to France, where he was attached to a Cypriot Transport Unit near G.H.Q. Subsequently he was sent to take over an Indian Transport Unit attached to the French Army south of Metz. That was just before the retreat on Dunkirk, and probably accounted for his not being evacuated to England. He is believed to have been taken prisoner when the French capitulated on June 16th or 17th.

News that Major Eardley was a prisoner of war was first received through the Red Cross and was notified in our issue of September 14th, when we were able to give his address as follows: Major F. J. Eardley, R.A.V.C., British Prisoner of War, No. 995, Oflag VII C, Germany.

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Communications for Prisoners of War

The Post Office have issued a memorandum (P 2280 E) setting out the way in which communications may be sent to prisoners of war interned abroad.

Letters and postcards may be sent post free in the ordinary way and should not be sent to the British Red Cross Society to be forwarded. They should be clearly written or typed, and letters should not exceed two sides of a sheet of notepaper; otherwise they are liable to delay and may even not be delivered by the authorities in the country to which they are addressed. They must only deal with purely personal matters. It is important that the address be written in ink both on the letter itself and the envelope.

Parcels.—These cannot be despatched direct to a prisoner of war. The Invalids Comforts Section of the British Red Cross organisation despatches every four weeks consignments of ordinary household drugs, bandages, lint, dressings, etc., together with such things as cod-liver oil, malt, tonics and invalid food and comforts addressed to the Senior Officer of the Prisoners of War Camp, so that in the case of illness or of minor injuries that are not sufficiently serious for hospital treatment remedies may be at hand when needed. Relatives of a prisoner can send to the Invalid Comforts Section medicines or special remedies *direct from their own chemist*, to be included in these parcels, and these things will be labelled for the prisoner for whom they are intended. Postage on parcels so sent to the British Red Cross must be paid at the ordinary inland rates. At the request of the relatives, or the Senior Officer of the Camp, individual food parcels can be arranged for serious or chronic cases requiring special diet.

Once every three months the next-of-kin of a prisoner is allowed to send him a "personal" parcel which must weigh not more than 10 lb. The parcel must be sent c/o British Red Cross Society and Order of St. John, 14, Finsbury Circus, London, E.C.2. This organisation sends to the prison camps for every prisoner of war, as soon as notification of internment has been received, a number of personal articles of clothing, with a toothbrush, tooth paste (in tins, not tubes), razor and blades and a shaving stick.

In addition to these articles, relatives are allowed to send, through the Red Cross organisation: brilliantine in tins, brushes of all kinds, soap of all kinds, face cloths and sponges.

Educational Books.—The Educational Books Section of the British Red Cross Society arranges for prisoners of war to continue their preparation for examinations, and enables them to undertake vocational training with a view to preparing themselves for the after-war period. The Society gives advice, and arranges for books to be sent to any prisoner wishing to read a special subject. Forms of request for these books are sent to the prison camps. Financial contributions from relatives and friends are invited, but when these cannot be given the Society undertakes the whole cost. Correspondence courses cannot be sent direct to prisoners of war, but on application to the Society help will be given as to possible means of despatch.

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R.C.V.S. OBITUARY

Freeman, Richard Birt, Cooldrinagh, Leixlip, Co. Dublin. Graduated Glasgow, April 20th, 1886. Died October 27th, 1940; aged 78 years.

Grimes, Arthur Rowland, Newington, Bawtry, Yorks. Graduated London, December 21st, 1895. Died October 22nd, 1940; aged 67 years.

Thornton, Harry, 2, Carlton Street, Leicester. Graduated London, December 19th, 1918. Died November 3rd, 1940; aged 42 years.

Mr. R. B. Freeman, M.R.C.V.S.

Mr. R. B. Freeman, who practised in Dublin for over fifty years, was born in Clontarf, and at the age of 25 qualified as a veterinary surgeon in Glasgow. Returning to Dublin, he joined his brother in a professional capacity, and was one of the best-known veterinary surgeons in Ireland. A keen follower of hounds, he was an active member of the Ward Union, Meath and Kildare Hunts. He married Miss Goodbody, of Obelisk Park, Blackrock, who died some years ago. He is survived by two sons and a daughter.

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Mr. A. H. Grimes, M.R.C.V.S.

Mr. A. H. Grimes, who at one time practised his profession, came of a well-known family of Derbyshire farmers, and had retired from farming, his major interest. He was a well-known judge and breeder of Shire horses, and will be best remembered, in that capacity, as the owner of the world's record priced London champion shire mare. This mare, "Gleadthorpe Seclusion," realised £4,830 by public auction.

At one time Mr. Grimes was assistant veterinary surgeon to Mr. Moore, of Worksop. For a number of years Mr. Grimes lived in Sheffield.

The interment took place at City Road Cemetery, Sheffield, where a number of friends attended.

His wife pre-deceased him two years ago. Mr. Grimes leaves two sons and one daughter.

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Mr. Harry Thornton, M.R.C.V.S.

Mr. Harry Thornton's death at an early age will be mourned by his many friends in the profession in the Midlands, where, in partnership with Mr. G. R. Benbow, at Leicester, he was a popular practitioner of high repute. Mr. Thornton passed away after pneumonia and other complications had supervened following an operation for appendicitis.

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RESTRICTIONS ON SLAUGHTERING

The Livestock (Restriction on Slaughtering) (No. 2) Order, 1940, made by the Minister of Food, makes certain minor changes from the previous Order which prohibited, except by licence, the slaughter of livestock for human consumption.

It will still be legal for an owner to slaughter an animal where such slaughter is immediately necessary or desirable because of accidental injury to the animal or its illness, but the new Order requires notice to be given in such a case within 48 hours to the District Chairman of Auctioneers at the collecting centre nearest to the place of slaughter. The District Chairman will give instructions for the disposal of the carcase.

It is also provided that in any proceedings in respect of an offence against this part of the Order the livestock in question shall be regarded as having been slaughtered for human consumption unless the contrary is proved.

The Order also makes it an offence to sell, or expose for sale, for human consumption meat derived from home-killed livestock unless the meat has been purchased from the Minister or his agent. This provision is designed to prevent the disposal for human consumption of meat from animals which have been illicitly slaughtered. Such meat may have escaped inspection and may possibly be diseased.

A further requirement, which comes into force on December 1st, is that all meat from livestock slaughtered in Great Britain (except from animals slaughtered for human consumption) and all meat from livestock which has died as a result of illness or accidental injury, where the meat is not fit for human consumption, shall be coloured as soon as possible in the manner prescribed by the Order.

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GLASS CAGES FOR DOGS

The above interesting development in small-animal hospital accommodation is recorded in the following description of a new type of ward at the Angell Memorial Animal Hospital, given in the August issue of *Our Dumb Animals*—the official organ of the Massachusetts S.P.C.A. While present circumstances scarcely favour the adoption here of such an attractive extension of sanitary provision, its introduction is worthy of note.

"Outstanding among the many improvements made in the plant and equipment of the Angell Memorial Animal Hospital during the past few months is a new 'glass ward' containing 34 cages for dogs. The room was originally a horse ward, one of several needed when horse patients were much more numerous than at present. It had fallen into disuse, and the increasing demands for small-animal space suggested the remodelling of the ward to that purpose.

"Translucent glass forms the side walls and backs of the cages, the idea being to admit more light and make them easier to clean. The frames are of steel, aluminium painted, with grille work in front and on top. Each cage is equipped with a covered drain to carry off the water when it is flushed. The floors are of cement. With the patients removed, the cages can readily be flushed out with a hot water hose in much less time and more effectively than with the older type of construction.

"Sanitation, in fact, is one of the prime objects attained in these 'glass wards,' and veterinarians declare they constitute the last word in that respect. Glass permits practically no dirt to accumulate, and what little does can be easily removed.

"The animal patients appear to be contented in the new cages, more so in the opinion of several of the doctors than in the older type of cages. That is a point that has been watched with a great deal of interest. The idea was original and it was not known just how the dogs would take to it. So far the veterinarian staff, which worked out the plans in consultation with Dr. Rowley, is satisfied it has hit upon a departure promising wide development."

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MINISTRY OF AGRICULTURE NEWS SERVICE

Mr. Churchill to Farmers

In the Front Line of Freedom

The Prime Minister has addressed an historic message to farmers in a letter to Mr. Tom Peacock, President of the National Farmers' Union, who wrote to him about agricultural prices. Mr. Churchill said:—

The letter you wrote to me on the subject of agricultural prices has had my serious consideration.

I need not tell you that the food production of our country is, at this hour of supreme crisis, one of the vital factors in our ability to resist and overcome a formidable enemy.

We rely on the farmers. We depend on the efforts they put forth in the fields of Britain. ...

I know that we can do this with complete confidence in their toil, their ingenuity and their readiness to accept hardship in a grave emergency affecting all our people.

The price levels have been fixed for the purpose of securing an increase in some types of production and a decline in others. They take their place in a general plan to meet the exceptional needs of the war.

In some cases they may impose burdens; in others there may even be a call to sacrifice of personal interest. But, taken as a whole, the price structure is believed to reconcile just treatment for the producer with the wide requirements of the nation.

Even if this were not so, the call to duty would still go out to the farms, as it does to the factories.

And I know that it would be answered by a stern resolve to make the best of the expedients at hand, to labour and strive and achieve, with no thought of obstacles and no heed of difficulties.

Only if we devote our lives and our energies wholly to the tasks of war can we survive the ordeal and gain the victory, which will save our people from intolerable servitude.

And in this service, the farming community, the home through the centuries of bold and independent men, is called to play a vital part. To-day the farms of Britain are the front line of freedom.

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Feeding Stuffs Supplies

Government's Livestock Policy for the Winter

The Government are asking farmers to economise in the use of feeding stuffs this winter. On every farm where store cattle are being fed, supplies should be so conserved that marketings of beef cattle will be evenly distributed over the next five or six months. An autumn glut and a spring shortage has to be avoided.

While no guarantee can be given in war-time, every effort will be made to provide feeders of cattle and sheep during the winter with some 60 per cent. of the supplies of oil cake which they purchased for such stock in the winter and spring of 1938/39. These supplies, too, will be more evenly distributed than was possible a year ago. The quantities of cotton seed cake will be reduced; but as far as possible the deficiency will be made good by larger supplies of linseed palm kernel and coconut cake.

While animals should not be marketed in store condition, farmers are not expected to aim at a high standard of finish.

In the interests of herd preservation, of land fertility and of future food supply, farmers should, in particular, retain the following classes of stock:—

(*a*) Dairy animals suitable for milk production.
(*b*) Pedigree stock, the slaughter of which is not necessary on grounds of disease or otherwise.
(*c*) Ewes, gimmers, and ewe lambs necessary for flock maintenance.
(*d*) Yearling beef cattle suitable for further feeding.
(*e*) Heifer calves likely to make useful dairy or beef animals.

It is hoped that farmers will give full co-operation in withholding these classes of stock. If they are offered at Collecting Centres in large numbers, it will be necessary in the national interest to restrict the number accepted for slaughter.

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More Kitchen Waste for Pigs.—Local authorities' salvage returns show that farmers are steadily increasing their demands for kitchen waste from towns. Starting almost from zero a year ago, organised collections brought in 8,000 tons in August. More than 200 local authorities collected it.

This is eight times the quantity salvaged as recently as March this year, and half as much as the total collected in the previous eleven months since the war began.

There is plenty more kitchen waste waiting to be saved from the incinerator for the pigs.

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In Brief

Fifteen hundred cheques of a gross value of £111,670 have been sent to farmers from the British Sugar Corporation's Peterborough factory in payment for 32,500 tons of beet delivered during September.

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It is computed that three sugar beet factories in one county will produce almost enough sugar to supply London for a full year on the basis of present rations.

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Caistor (Lincolnshire) Rural Council recently paid £114 6s. 0d. for rats killed at twopence a tail. It is officially estimated that rats do at least £25,000,000 worth of damage annually.

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Rye is a crop worth growing in war-time on light land. Its cultivation is simple. It can be satisfactorily grown with little manure on suitable land. Useful information about the crop is given in "Growmore" Leaflet No. 4, obtainable (free and post free) from the Ministry of Agriculture, Hotel Lindum, St. Annes, Lytham St. Annes, Lancs.

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Responsibility for the allocation of materials for agricultural building work carried out by private enterprise has been taken over by the Office of Works. Applications for materials should in future be addressed to Regional Licensing Officers, a list of whom has been supplied to each County War Agricultural Committee.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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RESERVATION OF THE PROFESSION

To the Editor of the Veterinary Record

Sir,—This morning I, in common with all other members of the profession, received a questionnaire the object of which, it seems to me, is to be an attempt to justify or otherwise the retention of veterinary surgeons in the Schedule of Reserved Occupations.

The question of reservation is, in many cases, purely a personal one and, this being so, it would seem only fair to allow each one of us to weigh the pros and cons and decide how his own circumstances enable him to serve his country best. But whilst agreeing in principle with the reservation of veterinary surgeons, and whilst I can have no "grouse" against it in so far as it affects me personally, I cannot help feeling that when the reservation decision was agreed upon it was never intended to apply to those of us situated as I find myself.

I am assistant in a practice which is predominantly a small-animal one and thus a luxury one in war-time, and to my mind it is wrong that petrol, valuable drugs, etc., and a young, active, fit and useful member of the community should largely be wasted by rendering merely the comparatively trivial services entailed. My work could be performed quite easily and efficiently by a woman or a man rejected for military service; in fact, much of it

during the last twelve months could have been done equally well by the average slaughterman.

It is true that I am helping to carry on the practice for a colleague who is now on active service, and if I were to remain here for the duration of the war I might find myself in a favourable position afterwards, but I cannot reconcile that easily to my conscience, nor look with gratitude upon a benevolent Providence which has seen fit to rob me of what I like to regard as my inheritance.

When, after this is all over, the tales come to be told of what we all did in the Great War to Save Civilisation I cannot think that I shall be able to raise any personal enthusiasm or command very rapt attention in the telling of the hundreds of beautiful dogs I shot or the miserable wrecks which I helped to keep alive.

If I could see myself safeguarding in some small way the nation's food supply I might be compensated in some measure for the thrill of hoping to fly a Spitfire or a Hurricane, but all my efforts to change my job have drawn but a stony silence from those who blushingly hide their identity beneath a box number's modest mask.

I am sure there must be many who feel as I do, and that I voice a common opinion when I suggest that some modification of the schedule might be devised that would allow those of us who wish to do so, and who can be spared, to volunteer without the present unnecessary complications.

Yours faithfully,
ERIC A. LEAVER.

304, The Broadway,
Bexleyheath,
Kent.
November 1st, 1940.

* * * * *

TREATMENT OF STRAINED TENDONS

TO THE EDITOR OF THE VETERINARY RECORD

Sir,—I am grateful for the interest shown by your correspondents in my article on strained tendons—to Mr. Campbell for his support and helpful suggestions and to Mr. Irving and Mr. Hancock for their criticism.

It was to determine for my own satisfaction whether or not the method of treatment was "useless," "no good" or "harmful" that I followed up the subsequent performance of all the cases I had fired over a two-year period and I was more than satisfied with the result, which was that 80 per cent. of the animals were able to stand training again. Most of them had raced several times and more than half of these had been winners since their treatment. No more severe test can surely be devised than training for and running in a steeplechase.

As for the charge of cruelty, no doubt cautery was the cause of severe pain to animals treated without anaesthesia by Mr. Hancock's grandfather and by mine, but I do not consider that horses fired under local anaesthetic and blistered with green blister suffer more than discomfort from the filled legs and irritation from the healing and scale formation; and these are also caused by blistering alone, which I believe is the only alternative treatment for animals that are to be used again for 'chasing or hunting.

Mr. Hancock does not state his method of treatment. Treatment by rest alone is satisfactory for animals passing through Mr. Irving's hands, but they are only destined for stud work and their tendons will not again be put to any severe test. They must look all right: firing damns them as stallions, calling attention to a weakness that might be transmitted. In racing practice the purpose of firing is to enable a horse to win steeplechases and it is, therefore, a treatment usually applied only to geldings.

Until it can be demonstrated that other methods of treatment are as good, owners and trainers of 'chasers and owners of hunters will continue to demand the use of the firing iron.

Yours faithfully,
A. C. FRASER.

Veterinary Establishment,
Lambourn,
Berks.
October 31st, 1940.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT OF 1937 (PART IV)

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th Oct., 1940	29	34	5	3,018	—	—	1	307	245
Corresponding period in ...									
1939	18	27	4	58	—	—	9	256	182
1938	19	29	1	66	—	—	1	55	43
1937	23	25	2	178	1	1	8	35	18
Total 1st January to 15th Oct. 1940	439	514	33	6,744	15	30	130	3,943	2,805
Corresponding period in									
1939	602	684	73	8,013	32	72	178	2,177	1,657
1938	647	1,024	163	20,699	44	74	126	585	446
1937	553	662	22	5,097	100	138	147	834	515

NOTE.—The figures for the current year are approximate only.

§ Excluding outbreaks in Army Horses.

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